

## MUTABILITY ANALYSIS IN JAVA

### ABSTRACT

A system and method for detecting the mutability of fields and classes in an arbitrary program component written in an object oriented programming language is disclosed. A variable is considered to be mutable if a new value is stored into it, as well as if any of its reachable variables are mutable. The system and method uses a static analysis algorithm which can be applied to any software component rather than whole programs. The analysis classifies fields and classes as either *mutable* or *immutable*. In order to facilitate open-world analysis, the algorithm identifies situations that expose variables to potential modification by code outside the component, as well as situations where variables are modified by the analyzed code. An implementation of the analysis is presented which focuses on detecting mutability of class variables, so as to avoid isolation problems. The implementation incorporates intra- and inter-procedural data-flow analyses and is shown to be highly scalable. Experimental results demonstrate the effectiveness of the algorithms.

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